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# Environmental effects of Covid-19 pandemic: An overview on water, air, biodiversity, waste generation and Agricultural allied sector

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## ABSTRACT

The world has been impacted due to corona virus disease outbreak in Wuhan city of China in 2019. The disease control methods employed and the resultant slowdown in economic activity have a beneficial effect on the environment. Based on this assessment, the pandemic had a beneficial impact on the environment such as air quality index, noise pollution, river water quality, and restoration of biodiversity in several areas around the world. It was documented and verified worldwide that throughout lockdown periods, overall environmental health condition was improved. On other hands generation of domestic and solid wastes impacted the treatment facilities in many undeveloped countries. It was also observed that pandemic had negative impact like production, food supply chain and export-import potential of agricultural and related sectors.

*Key word: Covid-19, Environmental effect, Air, Water, biodiversity, Wastewater generation, Agricultural and allied sector*

## Introduction

Health issues have increased exponentially over world as the Covid-19 pandemic has spread. Wuhan, China, was the first city to report the disease in December 2019 (Lu *et al.*, 2020; Zhu *et al.*, 2020). Covid-19 was the first term given to this disease when it was identified, but it has already spread to more than a hundred countries (WHO, 2019). The deadly effects of the disease have made it a top priority. Countries throughout the world have taken steps to reduce anthropogenic interactions to control the virus and manage including its impacts. In fact, curfews and lockdowns were imposed, along with quarantines, restrictions on public gatherings and transportation, encourage for isolation etc.

Global awareness of the growing pandemic threat is linked to improvement in air and water quality. There are also other factors which have contributed to enhance the air quality, in addition to less vehicles, ships, flights, closure of many industries etc. resulting emissions reductions. Relatively few people use the roadways, therefore there is less “cultural noise” than there was prior to the pandemic (Watts, 2020).

The pandemic is beneficial for environment, but it could also have unexpected effects. In some areas, wildlife populations have improved, and greenhouse gas emissions, noise pollution, and air quality have all improved. An increase in biomedical waste, the improper disposal of personal safety equipment, an increase in municipal waste, and a reduction in recycling activities were a few other negative effects.

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India, the second-largest country in the world, has faced significant air pollution in recent decades as a result of the rapid industrialization and population growth (Karambelas *et al.*, 2018). According to World Health Assembly, 13 Indian cities were among the 20 most polluted in the world (WHO, 2018). According to Balakrishnan *et al.* (2019), pollution may well have caused in 1.24 million deaths in 2017 and could have decreased farm productivity by even more than 30% (Lal, 2017). The Clean India Mission (CIM) is in support of reducing emissions and using clean fuels to reduce pollution levels. It seems that efforts to improve air quality which focused on either long- or short-term reductions are inadequate (Beig *et al.*, 2013; Purohit *et al.*, 2019; Banerjee *et al.*, 2017).

The study provides a summary and assessment of the various outcomes of the impacts of Covid-19, including the suspension of industrial and manufacturing activities and the restriction of transportation. In the paper included for the study, both favourable and unfavourable impacts on the environment are addressed.

### Methodology

In order to collect information and data for this study, a diverse variety of written literature, case studies, and records both from government and non-government organisations was studied. This paper collects and presents information and data from a wide range of sources in order to fully comprehend the environmental impacts of Covid-19.

### Discussion

Globally Covid-19 has an impact on the environment and climate. Restrictions and a slowdown in social and economic activities has resulted in a reduction in water pollution and an enhancement in air quality in many places. With respect of PPE kits, masks, hand gloves, and hospital waste, there could be an effect on the environment. Some potential impacts for Covid-19, mainly on the environment, are illustrated in Figure 1.

#### Improvement in river water quality

Due to its inability to properly treat this waste, India

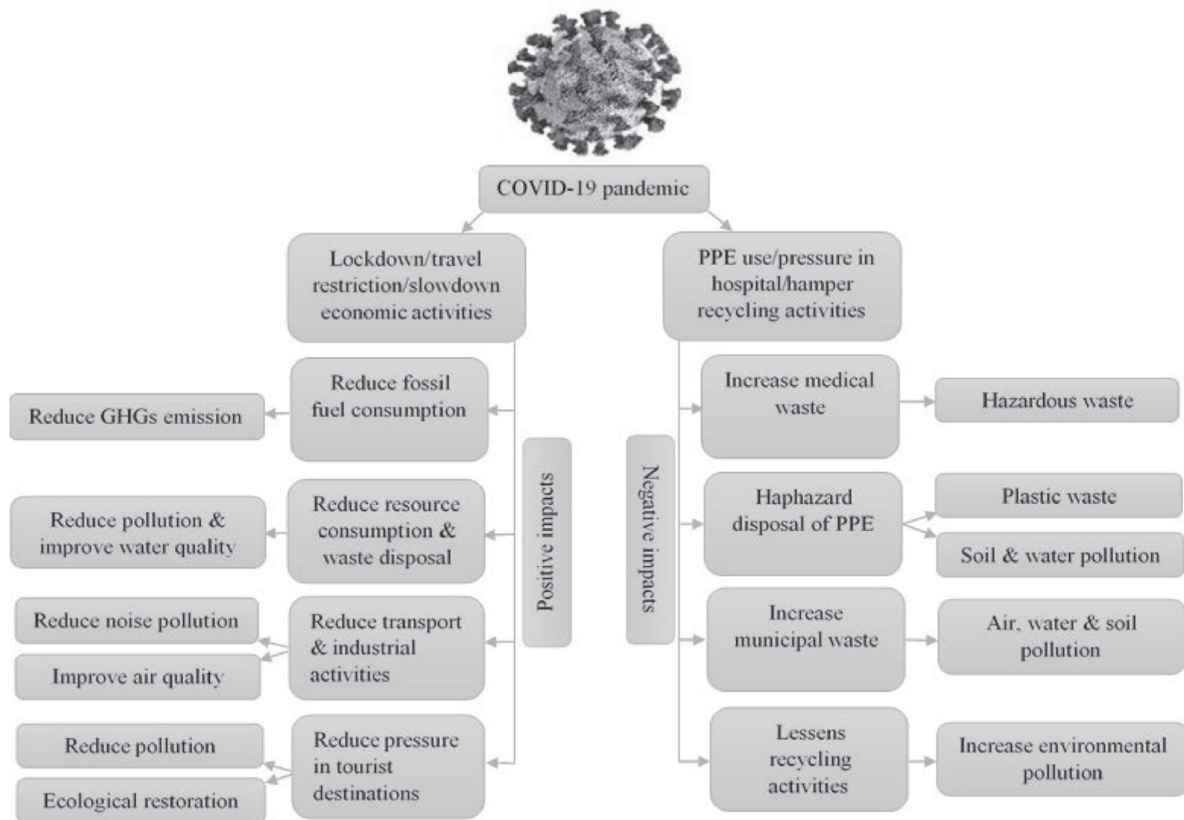


Fig. 1. COVID-19 pandemic effects on the ecosystem (Source- Rume *et al.*, 2020)

discharges 38 million litres of raw sewage into rivers every day (CPCB, 2015). 12 percent of the industrial effluent was dumped into the Ganga. Numerous Indian industries will also be affected due to Covid-19 from March 22 to September 30, 2020. Similarly, there is significant development in the quality and quantity of water along 2,575-kilometer Ganga River in northern India, which travels across several landmasses (Jain, 2015; Dutta *et al.*, 2020; Shukla *et al.*, 2021). Over the past couple months, the Ganga has experienced a significant increase in many parameters, particularly dissolved oxygen, biological oxygen demand, and nitrate concentration. The results of a study on water quality before and after the lockdown proved inadequate for analysis or modeling. It's also possible to study the other major rivers in India. The water quality in the Karnataka state in central and southern India has been an awesome thing to a Krishna and Cauvery rivers and their tributaries (KSPCB, 2020). According to national periodicals, the lockdown has decreased industrial effluents and other waste into Mumbai's waterways and creeks by 50%, rejuvenating the city's polluted rivers and streams (Smart water magazine, 2020).

Large urban catchments, including Delhi's Yamuna River, did not see significant changes in water quality since domestic sewage contributed for about 80% of pollution and industrial sources again for remaining 20% (India Water Portal, 2020). Even after the shutdown the Delhi's industries, contamination in the Yamuna increased. Quantitative evaluation of the impact on other rivers is impossible because of a lack of information and monitoring. As a result of the lockdown, the water quality from several rural Indian rivers has significantly improved. Major industrial and agricultural activities in the Ganga River's upper, middle, and lower regions must be stopped to enhance the water quality of the river. Dutta *et al.* (2020) have once more shown how a rise in river flow volume and discharge was induced by rainfall that really was significantly more than 60% over the historical annual average rainfall. Both the Yamuna and the Ganga have improved since the lockdown. According to Central Pollution Control Board (CPCB), the Ganga's water quality is presently at a standard level 27, making it appropriate for consumption for human as well as for reproduction of fishes and other aquatic organisms. This may be the consequence of suspended industrial and other activities. It is thus recommended the wastewater both from residential and commercial

industries be treated before being discharged into ecosystems.

### Reduction of GHG emissions and air pollution

Life-sustaining air contains 400 ppm carbon dioxide, 21% oxygen, and 79% nitrogen (US EPA, 2021). A number of natural cycles have been impacted by domestic, commercial, and human activities (Abdelkareem *et al.*, 2020; Elsaid *et al.*, 2021). Fossil fuel use interrupts natural cycles and increases concentrations of Carbon monoxide (CO), nitrogen monoxide (NO), Sulphur oxide (SO), particulate matter (PM), and ozone (Lenz and Cozzarini, 1999). From 1990 to 2016, there was an increase in the global oil emissions, from 35 to 49.4. In all, 92% overall emissions were carbon-based, with CO at 71-75% in 1990, 2010 and 2016, CH at 21-17% in 1990 and 2016, NO and other gases at 6-7 and 2-3%, and other gases at 0 and 2%, respectively (International Energy Agency, 2020).

The Centre for Climate and Energy Solutions estimated that energy, agriculture, and manufacturing industries generated 72, 11, and 6% of the world's largest greenhouse gas (GHG) emissions, respectively. Carbon emissions have increased as a consequence of the extensive use of fossil fuels such as coal, that are primarily made of oil, gas, and carbon (hydrocarbons). The incomplete combustion of fossil fuels causes the generation of CO, CO<sub>2</sub>, and volatile organic carbons, such as methane (Gaete-Morales *et al.*, 2019; Zhou and Feng, 2017). Transportation is the largest sector, making up about 22-25% of a total, following by industry (17-20%), the generation of heat and power (38-42%), and lastly, residential (6-9%). In order to combat global warming, carbon emissions have been reduced (Abdelkareem *et al.*, 2021; Wilberforce *et al.*, 2021).

Anthropogenic activities were reduced through industrial and public transportation restrictions. Significant emission reductions have been found throughout many studies aimed at reducing pollution and enhance air quality (Isaifan, 2020; Bao and Zhang, 2020; Gautam, 2020). Studies from various fields have shown that the air quality improved during the lockdown (Kumar *et al.*, 2020). As a consequence, the lockdown provides an important opportunity to evaluate the rate of anthropogenic emissions reduction and the improvement of the air quality. Anthropogenic emissions were significantly reduced through industrial regulations and public transportation. However, multiple studies showed

that significant emission reductions decreased air pollution and improved health of the environment (Isaifan, 2020; Bao and Zhang, 2020; Gautam, 2020). The lockdown has boosted the quality of both the air and water in India. Pollution levels significantly declined across Delhi, Bengaluru, Kolkata, and Lucknow. According to Wright (2020), levels for nitrogen dioxide have dropped by 71%, as well as the Central Pollution Control Board of the Ministry of Environment, Forests, and Climate change also made identical observations.

### Reduction of noise pollution

Noise pollution as a result of human activities that might affect both individuals and animals, such as using appliances, transportation, or construction (Goines and Hagler, 2007; Zambrano-Monserrate *et al.*, 2020). In addition to disturbing sleep, noise increases blood pressure and causes coronary heart disease (Kerns *et al.*, 2018). A recent study, 360 million people are at risk of hearing loss due to excessive noise (Sims, 2020). 100 million European, WHO claims that are highly exposed to noise (WHO, 2012). Anthropogenic noise pollution had to have an impact on the how prey and predator were recognized and avoid. Individuals were kept locked up throughout a quarantine or lockdown, that restricts industry and communications but relaxing many major cities (Zambrano-Monserrate *et al.*, 2020). Global airline and transport costs, in addition to noise pollution, have indeed been reduced through travel restrictions. Trains are running on scheduled; visitor air travel has been reduced about 90%, and vehicle traffic is reduced down 50%. The weather is pleasant, carbon dioxide emissions were decreased, and the air quality is improved as a result such shut-downs.

### Covid-19 impact on biodiversity

Human disturbance has reduced animal habitat and biodiversity. Pollution, deforestation, invasive species, and diseases affect biodiversity. Aquatic and tropical rainforests contain 90% biodiversity. Traffic affected terrestrial plants and animals. Oil and coastal activities affect marine ecosystems.

The lockdown supported terrestrial and aquatic ecosystems with biodiversity's despair. Marine, terrestrial, and animal life increased and returned to their original habitats without disturbance. Media sources report reduced noise and ocean industrial pollution to suspension of vehicles and industrial

operations near beaches and water. Japanese subways feature deer, Spanish subways contain wild boars, and US cities contain coyotes and foxes (Nagendra, 2020). Wild animals and sensitive species roamed rural and urban areas because of human mobility restrictions (Corlett *et al.*, 2020). 1.5 lakh migration Flamingo occurred in Mumbai wetlands in April, 2020. On isolated beaches in Brazil and India, vulnerable hawksbill and olive ridley sea turtles breed. Several wildlife behavioural reports exist.

### Domestic and municipal waste generation

Covid-19 challenges household waste workers and organisations, stopped collecting, sorting, recycling, and disposing domestic waste. Novel coronaviruses impacted domestic waste management in various countries. Plastic manufacturing and usage were global issues. Covid-19 has affected waste management, particularly in developing countries (Nzediegwu and Chang, 2020; Shammi and Tareq, 2020). Global crises and pandemics impacted waste generation. Most countries struggle to deal with waste during pandemics due to waste volume and content changes (Ouh sine *et al.*, 2020).

### Generation of solid waste

Biomedical wastes are generated during treating, diagnostic, conducting, or vaccination animals and humans, according to the WHO (2020). Personal protective equipment (PPE), gloves, masks, and other wearables may be utilized by patients and healthcare professionals during regular or public community health services (Govt. of India. Ministry of Environment and Forests Gazette notification no 460 dated July 27, New Delhi. 1998:10–20).

The ministry of environment, forests, and climate change enforced the biomedical waste (BMW) management regulations during 2016 and 2018 (Ministry of Environment, Forest, and Climate Change. New Delhi, 2016). India is the second-most populated country after China and the second-worst affected by Covid-19 after the US, reported by the (US Census Bureau Current Population, 2020 and <https://www.worldometers.info/coronavirus/>). India's resource management system will make Covid-19 a major issue (Anwer and Faizan, 2020). Untreated BMW spread infection (Ramteke and Sahu, 2020). According to the central pollution control board (CPCB), India reported 517 tonnes of BMW daily in 2016 and 501 tonnes every day in 2015, of which 4-



5% needed medical attention (CPCB, 2017-18). CPCB processed 557 tonnes solid waste BMW every day in 2017. BMW come from 238,170 health systems, comprising 87,267 beds and 151,208 non-bedded facilities. 28 CBMWFs are now being built worldwide.

### Other environmental effects

Roads, workplaces, and residential areas have recently received a significant amount of disinfectant sprinkling in an attempt to eradicate deadly SARS-CoV-2 virus. The extinction of beneficial microorganisms that are not even targeted by these extensive disinfectant use may result to an ecological imbalance (Islam and Bhuiyan, 2015). Similar to the that, the Covid-19 virus was detected in the faeces of the Covid-19 patient in addition to municipal wastewater from many other countries, including Australia, India, Sweden, the Netherlands, and the United States (Ahmed *et al.*, 2020; Nghiem *et al.*, 2020; Mallapaty, 2020). Therefore, additional wastewater treatment methods are needed, which is challenging for developing countries like Bangladesh where municipal wastewater is discharged into nearby water bodies and rivers without treatment (Islam and Azam, 2015; Rahman and Islam, 2016). China has already upgraded the disinfection method by using chlorine to prevent the virus from propagating through the wastewater. However, adding too much chlorine to the water may have adverse effects (Zambrano-Monserrate *et al.*, 2020).

### Effects of Covid-19 on the Indian agriculture and allied sector

Uncertainty, interstate movement restrictions, and a lack of transportation seemed to have an impact on agriculture-related operations, that disrupted food supply chains and increased food prices (Kalsi *et al.*, 2020). A month after a lockdown, both wholesale and retail prices of pulses, wheat flour, and milk were 1-5% higher, while those of edible oils and staple cereals (rice and wheat) were 4-9% more costly as import restrictions and government interventions, like the free distribution of food grains, were removed. Tomato prices increased after even a lockdown with 77-78% in a week and 114-117% in a month (Cariappa *et al.*, 2020). Market reforms and distress boost May arrivals (Varshney *et al.*, 2020).

75% of customers noticed higher food costs during the lockdown (Cariappa *et al.*, 2020). The Indian government has managed rising prices and social

unrest with correct market reforms and safety nets for the underprivileged, migrants, and farmers (Bellemare, 2015). With short-term governmental support, even the sector would have benefited (Varshney *et al.*, 2020). The Covid-19 lockdown in India had such an impact on the way individuals purchased and consumed food. A study reports that lockdown impacts the economy (Arun, 2020; Cariappa *et al.*, 2020; Imbert, 2020; Ray, 2020). Security for food and nutrition in India was going to be affected by lockdown and the income shock. 32% of the 2259 migrant kids who participated in the survey reported that they were consuming less (Imbert, 2020).

Following China, the secured second position in the world in fish production. Fish is consumed about 60% of Indians, and 14.5 million people are participating in fishing and related activities. Fisheries contributes 5.23% to agriculture and 1.1% to a total GDP (NFDB).

Supply and demand are declining, that is weakening the global financial system owing to Covid-19 pandemic. Indian fish exports have increased by about 6% in 2018-19 to 13.34 million metric tonnes. It ranks fourth globally in terms overall seafood exports. The total 13,77,244 tonnes and \$7.08 billion worth of seafood was exported from India in 2018. Andhra Pradesh, West Bengal, and Uttar Pradesh are the top states in inland production. Gujarat was the highest state in fishery products. Fishing is banned because the closure for storage, markets, and processing facilities for about 21 days. On 9, April, 2020 fishing and aquaculture were allowed to operate in socially deprived India. Fish and fisheries products are greatly affected by changes in the food sector and the distribution network. Restaurants, ice factories, processing plants, feed plants, and seed units struggled financially and socially as India banned non-essential activities. In order to be ready for a lockdown similar situation to something like this, the aquaculture industry must be considered a vital and priority sector.

### Conclusion

The purpose of this paper was to highlight the environmental impacts of Covid-19, either good and negative. Many countries have place social, commercial, and industrial activities under quarantine in an effort to prevent SARS-CoV-2. Many environmental effects of the quarantine and lockdown en-

forced during Covid-19 disease outbreak were beneficial because the air and water quality were improved. The report summarises several Covid-19 effects on air, water, wastewater, and solid waste. However, the SARS-CoV-2 virus has deteriorated the quality of wastewater, requiring proper treatment to prevent the spread of Covid-19. The organic load in wastewater is enhanced with hand sanitizers, disinfectants, and some medicines. The Covid-19 pandemic particularly impacts solid waste, which would be negatively affected by single-use PPE and medical supplies. The effect was felt in agriculture and related industries. The government and politicians must take action to make this healing permanent.

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